



RENEWABLES FOR SUSTAINABLE  
VILLAGE POWER

# PROJECT BRIEF

## Rural Electrification in South Africa

by Doug Arent 1/98

Approximately 20% of South Africa's rural population is not expected to get utility grid electricity for at least the next 20 years. Many rural South Africans, similar to other rural markets in the developing world, live in sparsely populated, widely dispersed villages with small load requirements. Modular, renewable energy power generation is a cost-effective way to provide clean, affordable, and long lasting low-load electricity to such markets. The South African government recognizes the importance of renewable energy technologies and the capabilities of the photovoltaic (PV) industry in South Africa. The government has approved the use of PV for the electrification of 2000 clinics and 16,800 schools serving this population. Using PV systems to electrify for lighting, television/radio, and light manufacturing in an estimated 2.5 million homes and 100,000 small businesses is accepted as complementary and integral to the extensive South African grid-electrification program. These efforts, however, must overcome key market barriers such as the availability of flexible, small scale financing for the rural populace, and establishing an adequate delivery, installation, and maintenance infrastructure to lower the transaction costs associated with dispersed customer bases.

Through the Energy for Development Directorate of the South African Department of Minerals and Energy (DME), approaches will be developed for bringing off-grid sustainable electricity to the rural population. The DME, along with the United States and other international partners, is launching a pilot program that will install at least 2500 photovoltaic systems in rural South Africa. Under support of the U.S. Department of Energy (DOE) and the U.S./South Africa Binational Commission, the National Rural Electric Cooperative Association (NRECA) is bringing their six decades of relevant experience to the pilot. Technical and financial consultation is being provided by the DOE national laboratories.

The Energy for Development Directorate of the DME has a broad portfolio of activities beyond the electrification of rural South Africa. Their other efforts include rural water pumping systems, biomass initiatives, resource assessment, energy conscious low-income housing, education campaigns and hybrid power systems for villages and farms. The latter are being pursued through joint efforts of NREL and the Energy for Development Research Center at the University of Capetown.

The project partners will conduct system modeling and create a design manual that will complement the Remote Area Power Supply Manual Series previously released by the DME.

The major challenge to bringing small scale, renewable energy electrification to rural South Africa is the creation of sustainable delivery channels for information, hardware, and financing. Four basic delivery models for the pilot project have been defined. Two models, the ESKOM Model and the Community-Based Model, will draw heavily on the infrastructure already created by ESKOM (rural schools) and the Independent Development Trust, IDT, (rural clinics). The two models are expected to provide guidance for the bulk of the first installations. Two others, the Industry-Led Model and Solar Store Model, are largely untried, but have motivated industry to submit several unsolicited proposals for pilot operations. The DOE-supported Mobile Demonstration Unit will house consumer education and training. The unit was loaded onto a locally manufactured utility trailer that can be towed by a small pickup truck and will serve as part of the community outreach and consumer education efforts of the pilot project.

Efficient distribution channels for the delivery of complementary energy supplies such as PV systems for electricity and liquefied petroleum gas for cooking are being considered for inclusion in pilot efforts in several provinces. A community workshop, held in early July 1997 in Mpumalanga Province, identified many outstanding issues and generated considerable enthusiasm for community participation, and entrepreneurial development. Residents were also eager to learn about the opportunities to reduce their reliance on wood and kerosene.

Initial coordination of training standards was the subject of a September 1997 workshop conducted by the Institute of Sustainable Power. Under DME leadership, with the support of the Development Bank of Southern Africa and the U.S. Information Service, and in cooperation with the South African Department of Education and the Electrical Contractors Board, the initiative hopes to facilitate accreditation of training experts and certification for photovoltaic system professionals.

The initial availability of risk reduction financing through the planned Electrification Fund is key to achieving sustainable rural electrification in South Africa. Also important is the

anticipated support for PV electrification from the Electricity Policy Coordinating Committee. The committee believes renewable power options are economically superior alternatives to line extensions for meeting much of the 450,000 annual connections quota. It is estimated that the rural electrification market lifetime will last 20 years, and the total value of installed hardware will be approximately \$1 billion.

### **NREL Contact**

Web site: <http://www.rsvp.nrel.gov>

Roger Taylor  
Phone: (303) 384-7389  
e-mail: [roger\\_taylor@nrel.gov](mailto:roger_taylor@nrel.gov)

### **South Africa Contact**

Department of Minerals and Energy  
Republic of South Africa  
Energy for Development Directorate  
Private Bag x59  
Pretoria 0001  
South Africa

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